Name_____   Date_____

Rolling a Die and Relative Frequency

Let's use coding to explore the likelihood of rolling a 3 on a die.

Part 1

We'll start by rolling a die in Scratch and checking to see if a 3 is rolled.

1. Click the link to access Scratch: Simple Dice Roll Completed:

   https://scratch.mit.edu/projects/878484676/editor/

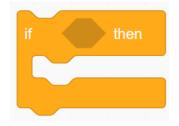   ➢ Click the green flag to see what happens.

     A die is rolled each time the green flag is clicked.

2. Let's alter the code to check if a 3 is rolled.

   We will need to use a conditional structure.

   Conditional structures are statements that tell computers to complete different actions based on different situations.
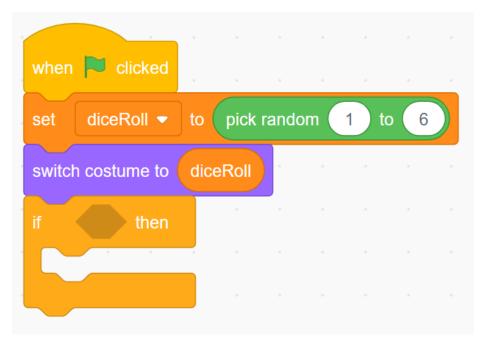
   In Scratch, conditional structures, or if statements, are found in the **Control** tab. The **if** statement will check if a condition is true and if it is, it will execute the code after the word **then**. If the condition is not true, then nothing will happen.
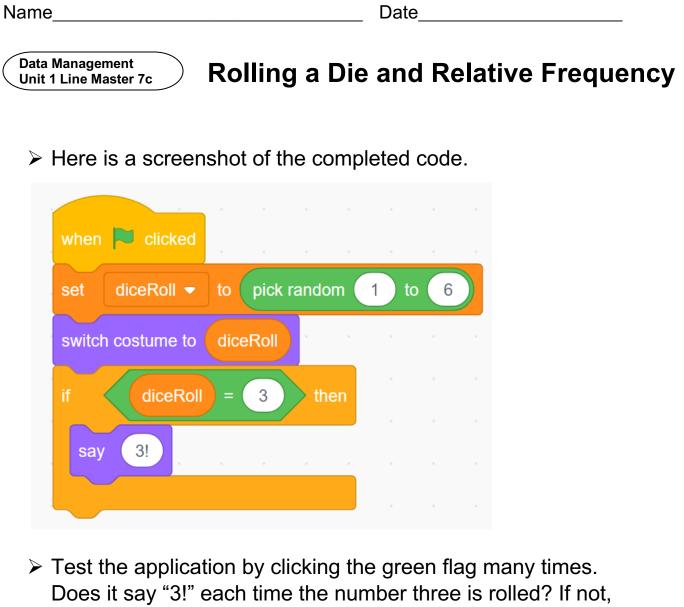

Mathology 6 Alberta, *Statistics*
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Name_____ Date_____

Rolling a Die and Relative Frequency

➢ From the **Control** tab, select the **if** block and drag it below the **switch costume** block:

3. Now we will add the condition for the if statement.

➢ From the **Operators** tab, select the **equal comparison operator** ( ) and drag it inside of the conditional part of the **if** block.
➢ From the **Variables** tab, select the **diceRoll** variable, and place it inside the first part of the **equal comparison operator**.
➢ Type **3** in the second part of the **equal comparison operator**.
➢ From the **Looks** tab, select the **say** block and place it inside of the **if** block.
➢ Type **3!** inside the **say** block.

Name_____ Date_____

Rolling a Die and Relative Frequency

➢ Here is a screenshot of the completed code.

➢ Test the application by clicking the green flag many times. Does it say "3!" each time the number three is rolled? If not, debug the application by carefully looking through the code.

Name_____ Date_____

Rolling a Die and Relative Frequency

Part 2

Let's use code to calculate the relative frequency of rolling a 3.

1. We can calculate the likelihood of rolling a 3 using simple math:

   There are 6 possible outcomes when rolling a die:
   1, 2, 3, 4, 5, 6

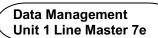   So, the likelihood of rolling each of the numbers is 1 in 6, or $\frac{1}{6}$, or about 0.17.

   So, the likelihood of rolling a 3 is $\frac{1}{6}$.

2. We can describe the likelihood of an outcome in an experiment using relative frequency.

   > Frequency can be a count of categorized observations or trials in an experiment. Relative frequency of outcomes can be used to estimate the likelihood of an event.

   In our code, we will keep track of the number of times a 3 is rolled and the total number of rolls.

   Each time we click the green flag to roll the die, we will calculate the relative frequency of rolling a 3.
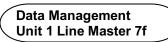
Rolling a Die and Relative Frequency

We will need three more variables in our application. We already have one variable called ***diceRoll***, which holds the number that is rolled on the die.

We will create these additional variables:
- **numRolls** to keep track of the number of times the die is rolled, which is also the number of times the green flag is clicked.
- **num3Rolled** to keep track of the number of times a 3 is rolled.
- **relativeFrequency** to keep track of the relative frequency of rolling a 3.

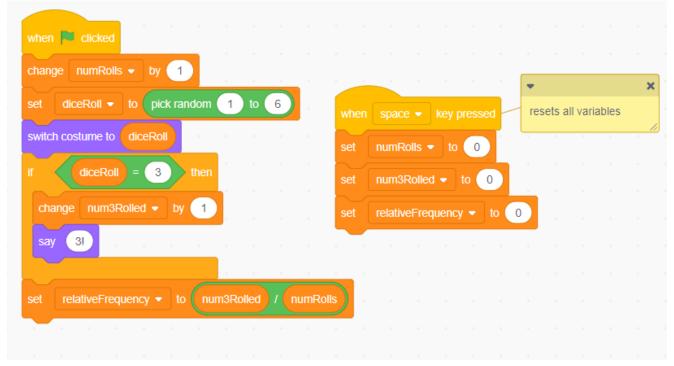Everything will be reset when we click the ***space*** bar.

Name_____ Date_____

Rolling a Die and Relative Frequency

You can alter your code from **Part A**, as shown below,
or you can click the link to the completed code with which you can
experiment.

Link to completed code:
https://scratch.mit.edu/projects/878489604/editor

Screenshot of code:

In **Master 8**, we'll add a loop so we can simulate rolling a die
hundreds, thousands, and even millions of times!